What is claimed is:

1. A nonvolatile semiconductor memory device comprising:

a first wiring extending in a first direction;

a first memory element so arranged as to be connected with said first wiring;

a second wiring extending in a second direction which is different from said first direction, said second wiring being connected with said first memory element;

a second memory element so arranged as to be connected with said second wiring;

a third wiring extending in said first direction, said third wiring being connected with said second memory element;

wherein said first memory element is constructed of an insulation film and two or more of ferromagnetic thin films disposed adjacent to opposite sides of said insulation film, said ferromagnetic thin films being connected with said first wiring and said second wiring;

wherein said second memory element is constructed of an insulation film and two or more of ferromagnetic thin films disposed adjacent to opposite sides of said insulation film, said ferromagnetic thin films being connected with said second wiring and said third wiring;

wherein a difference in magnetization direction between said two or more of said ferromagnetic thin films is stored as a piece of information, said piece of information being retrieved by using variations in electric resistance value of said memory element when a tunnel current flows through said memory element, said variations in electric resistance value of said memory being caused by a magnetoresistive effect resulted from said difference in direction

between said magnetizations of said two or more of said ferromagnetic thin films;

wherein said first memory element pairs off with said second memory element without exception to store a piece of information opposed in meaning to that stored in said second memory element.

2. The nonvolatile semiconductor memory device as set forth in claim 1, wherein

a plurality of each of said first, said second and said third wirings and a plurality of each of said first and said second memory elements are provided;

a write circuit connected with said first, said second and said third wiring to store said piece of information in both said first and said second memory element; and

a read circuit connected with said first, said second and said third wiring to retrieve said piece of information stored in said first and said second memory element.

3. The nonvolatile semiconductor memory device as set forth in claim 1, wherein said first direction is perpendicular to said second direction.

4. The nonvolatile semiconductor memory device as set forth in claim 2, wherein

said first wirings are arranged in parallel to each other on a first plane;

said second wiring are arranged in parallel to each other on a second plane, said second plane being parallel to said first plane and disposed over said first plane;

said third wirings are arranged in parallel to each other on a third plane, said third plane being parallel to said first plane and disposed over said second plane;

said first memory elements are disposed on a forth plane, said forth plane being parallel to said first plane and disposed between said first and said second plane;

said second memory elements are disposed on a fifth plane, said fifth plane being parallel to said first plane and disposed between said second and said third plane.

5. The nonvolatile semiconductor memory device as set forth in claim 2, wherein

each of said write circuit and said read circuit is constructed of a semiconductor integrated circuit.

6. The nonvolatile semiconductor memory device as set forth in claim 1, wherein

a plurality of groups, each group of which is constructed of said first, said second and said third wiring and said first and said second memory element, are arranged through said insulation films.

7. In a method for recording information in a nonvolatile semiconductor memory device comprising: a first wiring extending in a first direction; a first memory element so arranged as to be connected with said first wiring; a second wiring extending in a second direction which is different from said first direction, said second wiring being connected with said first memory element; a second memory element so arranged as to be connected with said second wiring; a third wiring extending in said first direction, said third wiring being connected with said second memory element;

wherein said first memory element is constructed of an insulation film and two or more of ferromagnetic thin films disposed adjacent to opposite sides of said insulation film, said ferromagnetic thin films being connected with said first wiring

and said second wiring; said second memory element is constructed of an insulation film and two or more of ferromagnetic thin films disposed adjacent to opposite sides of said insulation film, said ferromagnetic thin films being connected with said second wiring and said third wiring; a difference in magnetization direction between said two or more of said ferromagnetic thin films is stored as a piece of information, said piece of information being retrieved by using variations in electric resistance value of said memory element when a tunnel current flows through said memory element, said variations in electric resistance value of said memory being caused by a magnetoresistive effect resulted from said difference in direction between said magnetizations of said two or more of said ferromagnetic thin films; said first memory element pairs off with said second memory element without exception to store a piece of information opposed in meaning to that stored in said second memory element,

the improvement therewith comprising the steps of:

magnetizing one or more of said ferromagnetic thin films of said first memory element in a direction parallel to or antiparallel to a direction of magnetization of the remaining ones of said ferromagnetic thin films other than said one or more of said ferromagnetic thin films to perform an information write operation in said nonvolatile semiconductor memory device; and

magnetizing one or more of said ferromagnetic thin films of said second memory element in a direction parallel to or antiparallel to a direction of magnetization of the remaining ones of said ferromagnetic thin films other than said one or more of said ferromagnetic thin films to perform said write operation of said piece of information in said nonvolatile semiconductor memory

device;

wherein: one of a first state and a second state is selected to perform said write operation; said first state is established when said one or more of said ferromagnetic thin films of said first memory element are magnetized in a direction parallel to a direction of magnetization of the remaining ones of said ferromagnetic thin films of said first memory element in a condition in which said one or more of said ferromagnetic thin films of said second memory element are magnetized in a direction antiparallel to a direction of magnetization of the remaining ones of said ferromagnetic thin films of said second memory element; and, said second state is established when said one or more of said ferromagnetic thin films of said first memory element are magnetized in a direction antiparallel to a direction of magnetization of the remaining ones of said ferromagnetic thin films of said first memory element in a condition in which said one or more of said ferromagnetic thin films of said second memory element are magnetized in a direction parallel to a direction of magnetization of the remaining ones of said ferromagnetic thin films of said second memory element;

wherein an information read operation of said nonvolatile semiconductor memory device is performed through the steps of: determining a first electric resistance value of said first memory element when said tunnel current flows through said first memory element; determining a second electric resistance value of said second memory element when said tunnel current flows through said second memory element; and, sensing a difference in electric resistance value between said first and said second electric resistance value to determine which of said first and said second states said memory device is currently in, whereby said information

read operation of said memory device is performed.

8. The method as set forth in claim 7, wherein said steps of magnetizing said one or more of said ferromagnetic thin films of said first memory element is carried out by using a magnetic filed, said magnetic field being generated by an electric current flowing through at least one of said first and said second wiring.

9. The method as set forth in claim 7, wherein said step of magnetizing said one or more of said ferromagnetic thin films of said second memory element is carried out by using a magnetic filed, said magnetic field being generated by an electric current flowing through at least one of said second and said third wiring.